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ABSTRACT

Because of the rising real cost of energy, geographic patterns that have dominated the contemporary metropolitan landscape are in a state of change. A conceptual model of the contemporary and future metropolitan landscape is presented to stimulate thought about the changes which may evolve in the spatial organization of urban regions as the real price of energy continues to increase relative to the other factors of production. It was also designed to suggest changes which should be implemented by local metropolitan regions in order to ease the transition to the post-petroleum age. The graphic model consists of a map and a population density curve for the contemporary and future metropolitan area. Each side of the diagram represents an idealization of population densities, land use patterns, and settlement structures displayed at a high level of generalization. Overall, the model shows that the contemporary metropolis has segrated land uses and is linear in growth, dispersed, dependent upon using automobiles, energy dependent, and energy wasteful. In contrast, the future metropolis has centralized energy growth, integrated land use, implemented mass transit lines, and is clustered, energy efficient, and energy self-reliant. Finally, this model has been and can be used as a learning activity, an inquiry exercise, in the geography energy college classroom. (Author/NE)

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ENERGY AND THE TRANSFORMATION OF A METROPOLITAN LANDSCAPE: CONTRASTING CONTEMPORARY AND FUTURE SETTLEMENT GEOGRAPHIES

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Introduction

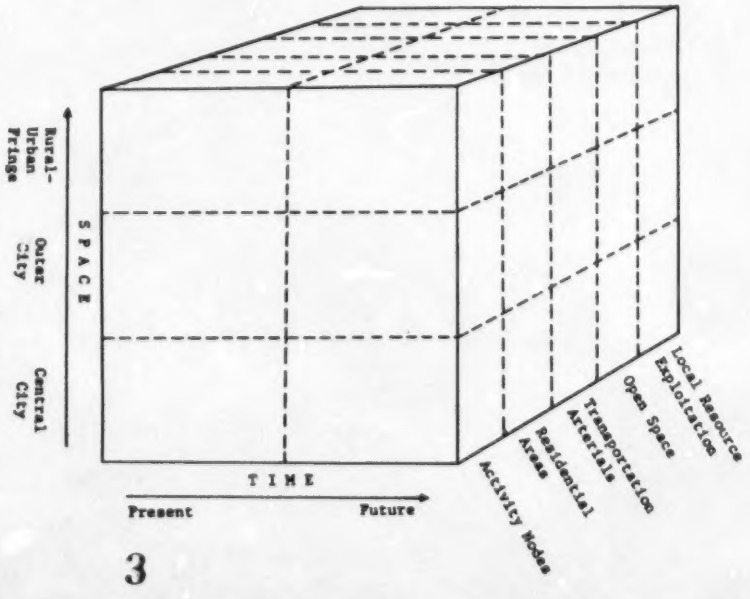
The geographic patterns which dominate the contemporary metropolitan landscape have evolved during an era of cheap and plentiful energy. Low-cost fossil fuels have, in fact, underwritten the pattern of urban sprawl which has taken place since World War II. During the 1970s, however, the cost of gasoline, electricity, and heating fuel increased dramatically. Individuals, businesses, and governmental units found that energy costs, direct and indirect, were absorbing a larger proportion of their disposable income.

The accompanying conceptual model of the contemporary and future metropolitan landscape was designed to stimulate thought about the changes which may evolve in the spatial organization of urban regions as the real price of energy continues to increase relative to the other factors of production. It was also designed to suggest changes which should be implemented by local metropolitan regions in order to ease the transition to the post-petroleum age. The graphic model consists of a map and a population density curve for the contemporary and future metropolitan area. Each side of the diagram represents an idealization of population densities, land use patterns, and settlement structures displayed at a high level of generalization.

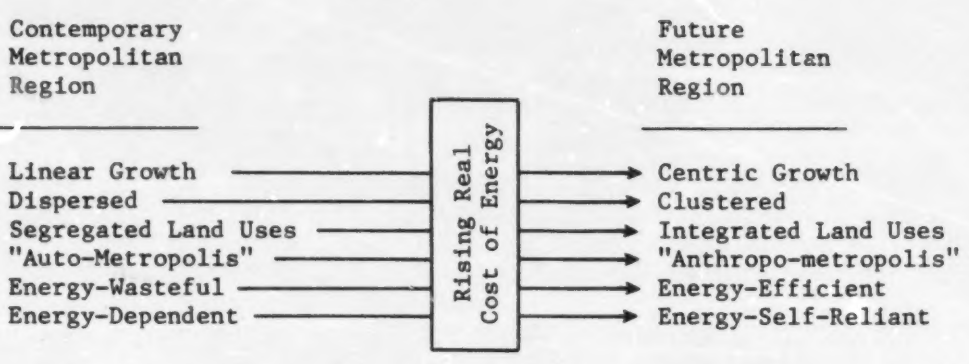
The idea for such a conceptual model originated as part of a series of energy workshops focusing on Genesee County (Flint), Michigan. Participants in these workshops included representatives of the public and private sectors, of the local and state governments, and of the Michigan State University community. The goal of these workshops was to arrive at a consensus on the public and private initiatives needed to ease the transition to a high-cost energy future. The diagrams which are being presented here summarize many of the ideas which dominated the workshop process. A final report of the energy workshop series is available from the Center for Environmental Quality of Michigan State University.*

A Time-Space-System Matrix

The adjacent three-dimensional matrix provides a systematic method for the analysis and interpretation of the maps and density curves. Time is represented along one axis, space along another, and selected systematic dimensions of the comparison along the third. What observations can you make about the map and the landscape itself and in which cell of the matrix would those observations be placed?



Summarizing the Contrast



Population Density Profiles

The Contemporary Metropolis: Population density is a function of distance from the city center. A density crater around the central business district is followed by a gentle exponential decline.

The Future Metropolis: Population density becomes an inverse function of distance from a set of multiple nuclei which anchor the metropolitan settlement system: (a) The most important nucleus re-emerges as the central city, thus, the disappearance of the density crater. (b) Other nuclei are important function activity nodes around which the metropolitan population is organized. (c) The areas between activity nodes and their residential envelopes are low-density regions.

Settlement Patterns

The following outline provides a beginning for filling up the cubical matrix which was presented on the previous page. The concept of Acitivity Nodes has been selected for comparison but a similar outline could be constructed for residential areas, transportation arterials, open spaces, and local resource exploitation.

ACTIVITY NODES

General Comparison

- Contemporary Metropolis: (i) Activity nodes highly specializaed and widely separated, e.g., industrial parks, commercial strips, office complexes, school and college campuses; (ii) Dispersed along major thoroughfares in a linear pattern.

- Future Metropolis: (i) Activity nodes highly diversified and compactly organized to facilite accessibility by a pedestrian or pedaling population; (ii)Larger centers have functionally specialized districts within the context of overall diversity; (iii) Clustered around points of maximum accessibility where they take on the function of community centers; (iv) Organized into a central place hierarchy of service centers.

Central City

- Contemporary Metropolis: (i)CBD comparatively small as a result of being poorly adapted to the automobile; (ii) Beyond the CBD activities arranged in linear patterns along major thoroughfares.

- Future Metropolis: (i) Revitalized CBD re-emerges as the point of maximum accessibility for the metropolitan region as a whole as a result of being the focus of mass transit lines; (ii) Beyond the CBD, activity nodes are clustered at points of maximum accessibility and serviced by mass transit.

Outer City

- Contemporary Metropolis: (i) Specialized and widely separated activity nodes consume much land and exert little influence on the location of residential development; (ii) Often comprised of services that cater not only to nearby communities but also to the metropolitan population as a whole (formerly a function of the CBD).

- Future Metropolis: (i) Diversified and compactly organized activity nodes become the nuclei around which other development coalesces; (ii) Comprised of a services geared to the community rather than the metropolitan market.

Rural-Urban Fringe

- Contemporary Metropolis: (i) Activity nodes are most ofen "free-standing" services such as convenience stores, schools, churches, etc., strung along rural thoroughfares or oriented to Interstate highway interchanges; (ii) Other activity nodes are the remnants of once-active business districts in rural towns and villages.

- Future Metropolis: (i) More diversified and compactly organized activity nodes take form in areas that are already heavily populated, around points of maximum accessibility. and in the old downtowns of revitalized rural villages; (ii) Locations of some activity nodes selected on the basis of near-by energy resources.

Using the Model in the Classroom

Although the conceptual model presented above was not developed as a classroom learning activity it has been successfully used as the basis for an inquiry exercise in the college classroom as part of course which the author taught on the Geography of Energy at Old Dominion University. The objectives of the exercise were (1) to focus the students' analytical powers on conceptualizing some of the changes that are likely to evolve on the landscape as a result of the rising real cost of energy, and (2) to give the students an opportunity to analyze a landscape in the abstract (as an assembly of points, lines, and areas) and apply that abstrct thinking to the local metropolitan area.

Materials

The following hand-outs were distributed to the class: (i) A map of "The Contemporary and Future Metropolis" with the identification of symbols in the legend suppressed; and (ii) A set of three blank matrices representing "slices" of the cubical matrix presented earlier. Examples of those matrices follow:

	Activity Nodes	
	Cont'ary	Future
CC		
OC		
RUF		
Gen-eral		

	Residential Areas	
	Cont'ary	Future
CC		
OC		
RUF		
Gen-eral		

	Open Space	
	Cont'ary	Future
CC		
OC		
RUF		
Gen-eral		

Procedures

(i) A general introduction to the exercise was presented as a lecture. Included was a definition of terms and local examples of landscapes that would be considered central city, outer city, and rural urban fringe.

(ii) The class was divided into four groups of 4-5 people each and asked to accomplish the following tasks:

To suggest the meaning of the symbols in the legend on the basis of where they were located on the maps. These were then confirmed by the instructor.

To contrast the contemporary and future metropolis by making observations of activity nodes, residential patterns, and open space. This required filling in the three blank matrices.

(iii) The small-group discussions were followed by a class discussion of the maps and the matrices. Some of the other questions discussed were: What settlement elements or other features of a more energy efficient and energy self-reliant metropolitan region might be added the the map? What evidence of changes on the landscape which result from the rising real cost of energy can be found in the local Norfolk-Virginia Beach metropolitan area? If the neighborhood in the vicinity of the University were being re-developed in anticipation of a continuing rise in energy prices, what changes should be effected?

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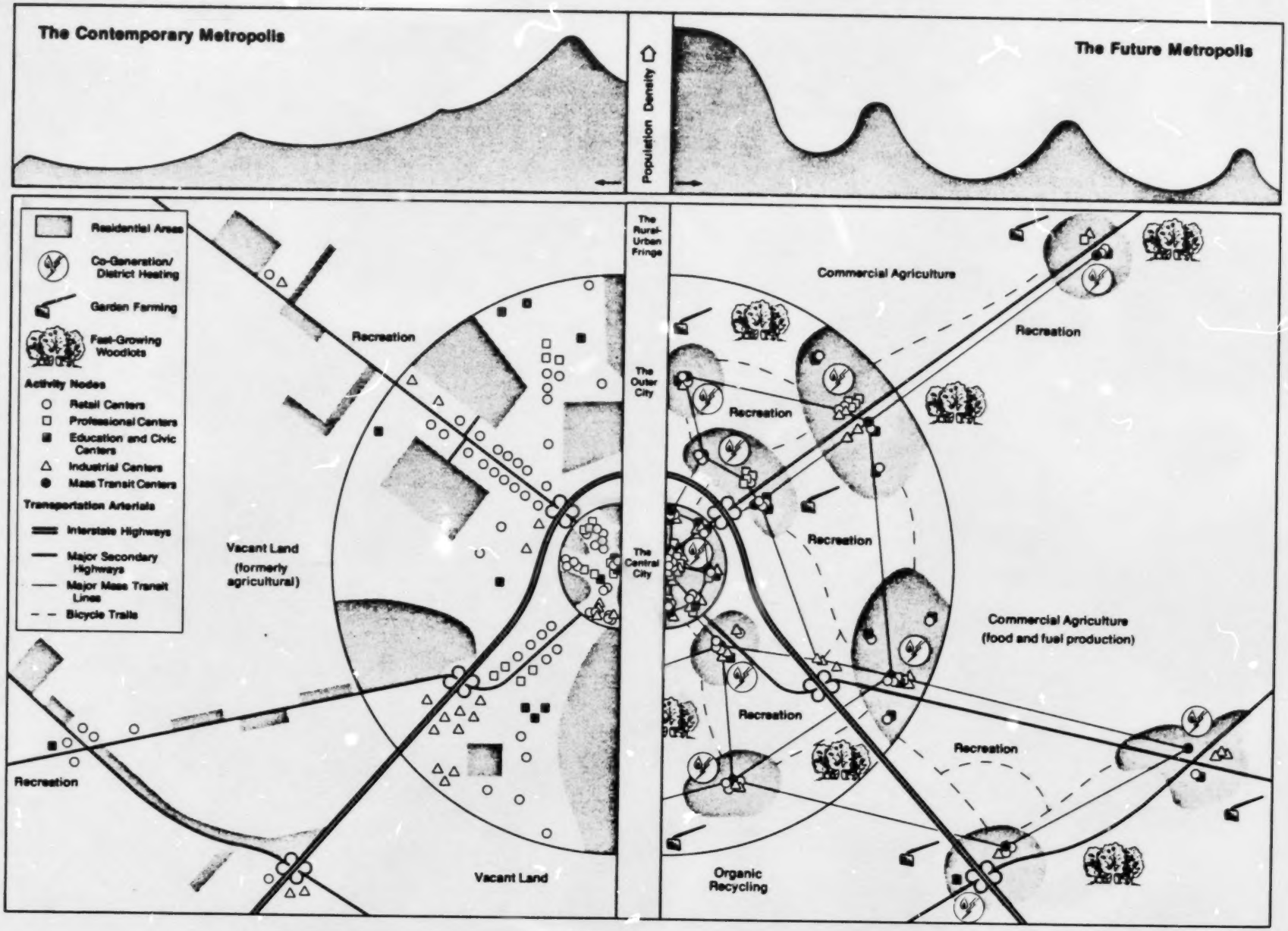
*Herman E. Koenig and Lawrence M. Sommers. Energy and the Adaptation of Human Settlements: A Prototype Process in Genesee County, Michigan. East Lansing: Center for Environmental Quality, Michigan State University, 1980.



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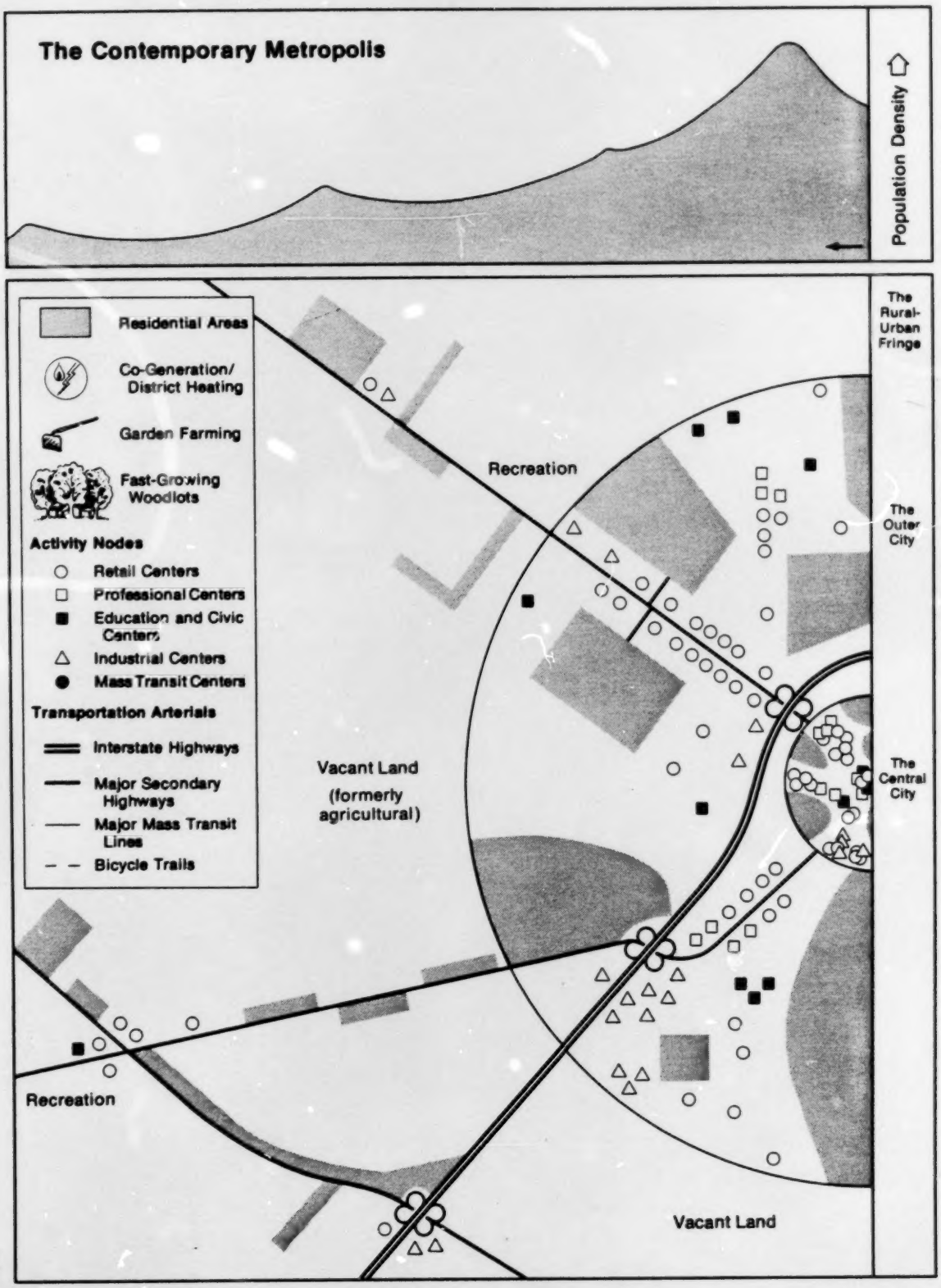
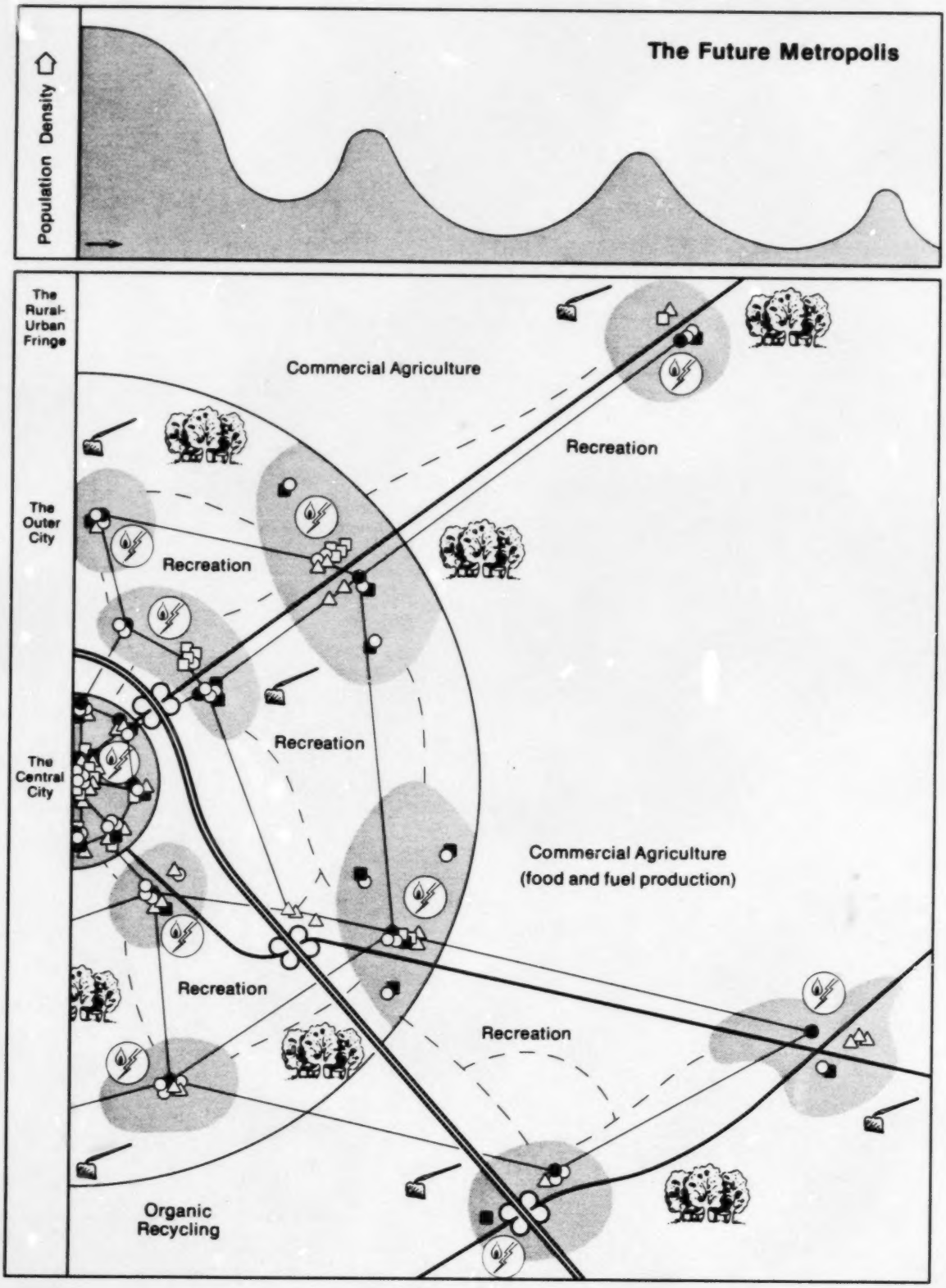

The Contemporary Metropolis
Population Density
Residential Areas
Co-Generation/ District Heating
Garden Farming
Fast-Growing Woodlots
Activity Nodes
Retail Centers
Professional Centers
Education and Civic Centers
Industrial Centers
Mass Transit Centers
Transportation Arterials
Interstate Highways
Major Secondary Highways
Major Mass Transit Lines
Bicycle Trails
The Rural-Urban Fringe
The Outer City
The Central City
Recreation
Vacant Land (formerly agricultural)
Recreation
Vacant Land


The Future Metropolis
Population Density
The Rural-Urban Fringe
The Outer City
The Central City
Commercial Agriculture
Recreation
Recreation
Recreation
Commercial Agriculture (food and fuel production)
Recreation
Recreation
Organic Recycling